REMARKS

Reconsideration of this application is respectfully requested.

In response to the drawing objections, minor corrections are requested as shown in red on the attached photocopies of several sheets of the drawings and the specification has been amended above. The additional drawing informalities noted on Form PTO 948 will also be resolved subject to the Examiner's approval of the other requested drawing changes and receipt of a Notice of Allowance.

The format of original claims 1-7 has been amended above so as to better conform to standard US practices. However, no change in claim scope is intended.

The rejection of claims 1 and 3-5 under 35 U.S.C. §103 as allegedly being made "obvious" based on Kaufman '252 and Takekoshi et al '208 is respectfully traversed.

As the Examiner has already recognized, Kaufman '252 is only relevant insofar as it teaches an MRI system that includes a movable patient couch.

By contrast, the applicant's presently claimed invention (e.g., see claim 1) establishes positional information with respect to the region of imaging interest and then, based on that provided position information, re-positions the patient in three dimensions so as to cause the region of interest to substantially coincide with an optimum imaging position. Of course, after such re-positioning, then the real diagnostic magnetic resonance imaging sequences can be performed with confidence that optimum imaging of the region of interest will be achieved.

The Examiner recognizes that Kaufman does not teach these novel features but alleges that Takekoshi does. As will be explained more fully below, the Examiner is believed to be erroneous in this assertion.

Initially, the Examiner asserts that Takekoshi teaches "a position information establishing apparatus which establishes position information of the region of interest of the patient". However, the Examiner relies upon Figures 7 and 9, component 72, 74 and 75 and text can be found at column 4, lines 52-65 and column 6, lines 10-30. Examination of this Takekoshi teaching demonstrates that it does not establish position information. Indeed, as may be recognized in Figure 11 and associated text, the manual control button pads 72, 74 and 75 are distributed around the MRI system so as to be conveniently available for manual operation. They simply permit the operator to move the patient left, right, up and down -- but do not establish any position information for the region of interest.

Indeed, the real region of interest of the patient is located inside the patient and doctors/technicians using Takekoshi '208 are provided no information that actually locates the real three-dimensional region of interest of the patient within the optimum three-dimensional imaging location of the MRI system. Indeed, presumably an implementation of Kaufman '252 would also include suitable manual controls for moving the patient couch (in at least one dimension).

However, there is nothing in either of the cited references that: (a) establishes three-dimensional position information of the region of interest and (b) then uses that provided position information to move the patient couch so that the region of interest is re-positioned in

three dimensions to be substantially either at the center of the static magnetic field or at the center of the gradient magnetic field (e.g., see claim 1).

The Examiner also alleges that Takekoshi teaches a "patient couch controller..." and cites to Figure 11, column 7, line 48 through column 8, line 24. However, once again, Figure 11 merely shows manually actuable patient couch movement buttons. Even if it is assumed that the doctor tries to locate the presumed region of interest approximately at an optimum imaging position, the doctor can really only guess at this process by manually manipulating the patient couch movement control buttons. There is no apparatus which derives three-dimensional position information of the region of interest and then uses that provided position information to re-position the couch so that the region of interest is actually positioned in three dimensions substantially either at the center of the static magnetic field or at the center of the gradient magnetic field.

At best, the cited references only teach or suggest an approximate positioning of the region of interest at an optimum imaging position based upon rough approximations and past experience of the human operator. There is nothing in either of these references that could possibly teach or suggest actual mechanized repositioning of the patient region of interest so as to actually be positioned in three dimensions substantially at an optimum imaging position within the system. Indeed, the real region of interest is located in three dimensions within the patient body -- which is generally unique to each particular patient.

Finally, the Examiner relies upon Figure 1 and "component" 41 and the text at column 6, lines 10-30 of Takekoshi. However, even though the "component" 41 is supposed to depict the

center of the lower magnet face, this clearly is not the desired center of the imaging volume where optimum imaging might take place. Instead, it must indicate a point located some distance below the center of the static/gradient fields. Furthermore, the teaching at column 6 is merely a description of the doctor's attempted approximate manual positioning to approximately place the region of interest at the desired optimum imaging location.

Applicant does not contest the fact that those in the prior art commonly desired to position the region of interest at an optimum imaging location. However, rather than merely guessing and approximating this desired result by manual manipulation of patient couch movement controlling buttons (or by iterative position/imaging steps), the applicant has actually gone about automating and mechanizing this process to a large degree so that after an initial approximate positioning, an accurate re-positioning can be quickly achieved so as to more substantially locate the actual region of interest in three dimensions at the desired three-dimensional optimum imaging location within the system. There is simply no such teaching or suggestion in either of the two references.

Accordingly, even if these two references are "combined", they still fail to in any way teach or suggest the applicant's claimed invention in claim 1.

With respect to claim 3, the Examiner alleges that Takekoshi teaches this limitation at column 6, lines 10-30 by teaching "light markers" indicating the center of a reference position. However, once again, the light markers are merely provided so as to assist in manual approximate positioning of the region of interest at a desired location. Unless the body being examined is transparent such that the doctor manipulating the manual controls can actually see in

three dimensions within the body, there is really no way that the light markers shining at (and reflecting from) the surface of a body can accurately locate the real therewithin three-dimensional region of interest at the real three-dimensional optimum imaging position.

Furthermore, claim 3 requires a "position detection apparatus" that detects the position of the region of interest. Clearly the light markers of Takekoshi define only fixed positions with respect to the MRI system -- and do not detect anything! They cannot possibly detect the position of the region of interest within a patient. Accordingly, there is no way these references could possibly suggest applicant's claim 3.

Applicant's claim 4 is directed to a further feature whereby an initial approximate positioning of the patient couch is achieved based on a signal from the position detection apparatus of claim 3. As already noted above, neither of the cited references even have any position detection apparatus of the type claimed.

The Examiner alleges that Takekoshi teaches this limitation with respect to Figure 11 and column 7, line 48 through column 8, line 24. However, once again, close reading of this text and of Figure 11 reveals that, at most, Takekoshi merely relies upon manual manipulation of couch control buttons based upon an operator's guesses so as to achieve an approximate positioning of a region of interest at a desired optimum location. There is no apparatus in Takekoshi that can perform an initial approximate positioning of the patient couch based upon a signal coming from a position detection apparatus.

With respect to claim 5, even though it is admitted that Takekoshi teaches a system capable of moving the patient in horizontal and vertical directions per se, this still does not supply the major deficiencies already noted above with respect to parent claim 1.

The rejection of claims 2, 6 and 7 under 35 U.S.C. §103 as allegedly being made "obvious" based on a three-way combination of Kaufman, Takekoshi and Kan et al '590 is also respectfully traversed.

With respect to claim 2, the Examiner admits that none of the three references actually teach establishing the position information of a region of interest from a patient image and then using that information from the image so as to re-position the region of interest at an optimum imaging location. However, the Examiner alleges that such would be made "obvious" merely because (a) it is known in the prior art that one generally desires to achieve such positioning (albeit the cited prior art only achieved approximate such positioning based upon manual guesses and approximations) and (b) Kan uses MR images to determine relative positions between interventional surgery instruments and a patient. However, with respect, it is noted that even if all three of these references are somehow "combined" arguendo, they still totally fail to teach re-positioning of a patient in three dimensions at an optimum imaging location based upon three dimensional position information obtained from an image of the patient.

The Examiner alleges that claim 6 is "just the method version of apparatus claims 1-5". However, with respect, it is not believed that method claim 5 corresponds to any one of apparatus claims 1-5 -- at least in the sense alleged by the Examiner.

In any event, claim 6 clearly requires (a) initially moving the patient couch so that a region of interest approximately coincides with an optimum imaging location; (b) reconstructing a plurality of patient images at that approximate location; (c) selecting one of those images that includes the region of interest; and (d) and then moving the patient couch based on that selected image so that the region of interest substantially coincides in three dimensions with the center of a static magnetic field or the center of the gradient magnetic field. There is clearly no such suggestion in any one or all three of the cited references even if they are combined arguendo.

With respect to claim 7, the Examiner appears to rely upon some unidentified reference or knowledge by alleging that use of one or more images for referencing an area prior to a full MR scan is known. However, even if that general information is combined with all of these references, there is still no teaching or suggestion of applicant's multi-step method of moving from an initial approximate three-dimensional location to a final substantially optimum three-dimensional location based upon relative three-dimensional spatial dimensions derived from the images.

The Examiner's attention is also drawn to new claims 8-12 which are believed to also be patentably distinct from the prior art.

Claim 8, for example, requires a three-dimensional position of a region of interest to be designated and then requires the patient couch to be moved so that designated region of interest substantially coincides three dimensionally with the center of the static magnetic field or the center of the gradient magnetic field. Claims 9 and 10 are dependent claims that add yet further patentable distinctions.

New method claim 11 requires positioning a patient region of interest at a first position within an MRI field of use, generating MRI images of the patient in three dimensions while located at that first position, locating and designating the patient region of interest position within those images, generating three dimensional position difference data between the designated position of the patient region of interest in the images and an optimum MR imaging position and, finally, re-positioning the patient region of interest in three dimensions from the first, now designated, position to an optimum MR imaging position using the position difference data. Dependent claim 12 requires the initial positioning step to utilize position data provided by a position sensor that automatically senses a relative spatial position between a movable patient and a fixed MRI system.

The Examiner's attention is also drawn to the attached Form PTO-1449 and an additional reference that has now come to the applicant's attention. The IDS fee for this stage of prosecution is attached and the Examiner is therefore respectfully requested to consider and cite this reference officially by returning an initialed copy of the Form PTO-1449.

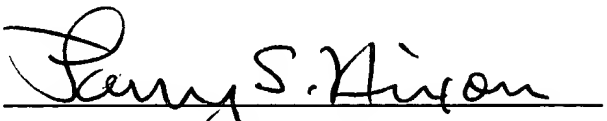
In this prior art, by selecting one of switches arranged on a table in a X-ray CT apparatus to select a slice position, a table is moved in accordance with the selected slice position. Though a high quality image can be obtained only in the center of an MRI image volume or field of view, in X-ray CT apparatus there is no such requirement and therefore no reason to conduct three-dimensional re-positioning. Further, by selecting one of switches, it is impossible to conduct a precise positioning.

Accordingly, this entire application is now believed to be in allowable condition and a formal Notice to that effect is respectfully solicited.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page/s is/are captioned "**Version With Markings To Show Changes Made**."

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

The paragraph beginning at page 11, line 1-5, replace this first paragraph on page 11 with the following:

Turning to Fig. 5, we see the vertical movement mechanism that is provided in the MRI apparatus according to the first embodiment of the present invention. As shown in Fig. 5, a vertical movement mechanism 34, which causes the tabletop 6 to move up and down, is provided on the tabletop [2] 6.

IN THE CLAIMS

Please amend the format of claims 1-7 to better conform with standard US practice.

1. (Amended) A magnetic resonance imaging apparatus comprising:

a static magnetic field generator for generating a static field;

a gradient magnetic field generator for generating a gradient magnetic field that is superimposed on the static magnetic field;

a radio-frequency magnetic field pulse transmitting/receiving unit, which applies a radio-frequency pulse to a region of interest of a patient that is located within the static magnetic field, and which also receives a magnetic resonance signal that is generated from the patient;

a patient couch, which enables movement of the patient;

a position information establishing apparatus which provides [establishes] 3-dimensional position information of the region of interest of the patient; and

a patient couch controller for moving the patient couch, based on the [region of interest] provided position information, so that the region of interest is re-positioned in 3-dimensions substantially either at the center of the static magnetic field, or at the center of the gradient magnetic field.

2. (Amended) A magnetic resonance imaging apparatus [according to] as in claim 1, wherein the position information establishing apparatus [comprises an input apparatus that inputs] accepts input position information[;] based on an image of the patient that is obtained from the magnetic resonance signal.

3. (Amended) A magnetic resonance imaging apparatus [according to] as in claim 1, wherein the position information establishing apparatus comprises a position detection apparatus that detects the position of the region of interest.

4. (Amended) A magnetic resonance imaging apparatus [according to] as in claim 3, wherein the patient couch controller performs an initial approximate positioning of the patient couch, based on a signal from the position detection apparatus.

5. (Amended) A magnetic resonance imaging apparatus [according to] as in claim 1, wherein the patient couch is capable of moving the patient in the horizontal and vertical directions.

6. (Amended) A method for performing magnetic resonance imaging diagnosis, said method comprising [the steps of]:

placing the patient onto a patient couch that is disposed within a static magnetic field and a gradient magnetic field;

moving the patient couch [approximately,] based on a signal from a position detector[,] so that [the] a region of interest of the patient approximately coincides with the center of the static magnetic field or the center of the gradient magnetic field;

applying a radio-frequency pulse to the region of interest of the patient, and receiving a magnetic resonance signal that is generated from the patient;

[reproducing] reconstructing a plurality of images of the patient, based on the magnetic resonance signal;

selecting an image that includes the region of interest from the plurality of images of the patient; and

moving the patient couch, based on the selected image, so that the region of interest of the patient substantially coincides [precisely] in 3-dimensions with the center of the static magnetic field or the center of the gradient magnetic field.

7. (Amended) A method for performing magnetic resonance imaging diagnosis [according to] as in claim 6, wherein the step of selecting an image further comprises a step of [selecting a] designating the region of interest within the selected image.